

REMARKS

The Office Action dated August 20, 2003, has been reviewed carefully and the application has been amended in a sincere effort to place it in condition for allowance.

Claim Rejections – 35 U.S.C. §102

Claims 3 and 5 were rejected under 35 U.S.C. §102(e) as being anticipated by United States Patent No. 6,488,837 to Ren et al. (“Ren”).

Briefly, Applicants’ invention, as claimed in claim 3, includes a direct methanol fuel cell system having a detector for detecting changes in a short circuit current produced by the fuel cell, and the detector generates a control signal indicative of those changes. The control signal is thus correspondingly indicative of changes in methanol concentration in that concentration is substantially linearly related to short circuit current, under typical operating circumstances. The fuel cell system of the invention also includes a concentration regulator that acts *in response to the control signal*. In response to the control signal, the concentration regulator varies the concentration of the fuel. This can be accomplished by adjusting the amount of methanol being delivered from the fuel source, or in the amount of water from the water source, for example.

The method of the invention as claimed in claim 5 is a method of regulating methanol concentration. It includes sensing one of a group of fuel cell operating characteristics such as potential across a load driven by the fuel cell, potential across a portion of a fuel cell stack, potential at a portion of the fuel cell’s anode, which is proximate to

the end of a methanol flow path, an open circuit potential of the fuel cell, a short circuit current of the fuel cell. Also, periodically, another one of those operating characteristics is checked. The measurements so taken are used to generate a control signal directing an associated concentration regulator to control the concentration of methanol. This can be done by making adjustments in the amount of fuel being delivered from the fuel source, or in the amount of water from the water source.

Thus, Applicants system and method are making concentration adjustments, responsive to a control signal that measures changes in certain operating characteristics that are related to methanol concentration.

In contrast Ren, is a passive sensor that incorporates a membrane electrode assembly (MEA), and the system measures a short circuit current across electrodes to provide an output signal that is functionally related to methanol concentration. Within the MEA, a physical barrier is used to control the access of methanol to the anode side. This is done for a specific reason as set forth in Col 3., lines 9-44 of the Ren patent. More specifically, "the physical barrier is designed to limit the overall flux of the methanol to the sensor anode to a value that is well below the supply of oxygen from air to the cathode." This controls the diffusion of methanol so that there is a diffusion limited methanol current such that "Because the methanol flux [a]cross the barrier is diffusion controlled, the sensor current response becomes proportional to the methanol concentration." (Col. 3, lines 42-44). Thus Ren's physical barrier is being used to control methanol flow so that diffusion is the dominant process so that the current of

the sensor is the diffusion limited methanol current that is proportional to methanol concentration. The Ren patent does not discuss sending a control signal to another device that responsively makes adjustments in the flow of methanol or water to the fuel cell in order to vary the methanol concentration. Instead, the Ren patent teaches a passive sensor that measures current.

The Examiner indicates that Ren's physical barrier can function as a concentration regulator because it restricts the flow of methanol, however, Ren's barrier is not responsive to a signal, rather it is a pin hole or slit in the anode current collector that results in restricted methanol flow. *It does not change in response to a signal to vary the concentration of methanol.*

Applicants' invention, on the other hand, involves a responsive system that can make adjustments to vary the concentration as desired in a particular application. In order to enhance and clarify this distinction which Applicants' invention has over the reference, amendments have been made herein to claims 3 and 5. Amended claim 3 now includes: "said concentration regulator being responsive to said control signal for varying the concentration of methanol in said fuel cell." Claim 5 recites: "using said alternately sensed operating characteristics to generate a control signal directing said concentration regulator to control a concentration of methanol in said fuel cell."

Accordingly, Applicants' claimed invention is not anticipated by the Ren patent because Ren does not teach a concentration regulator that is responsive to the control signal which and consequently makes adjustments to vary the methanol concentration in the system, as claimed in amended claims 3 and 5 of Applicants.

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Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Rita M. Rooney", is written over a horizontal line.

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